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USDA ■ Forest Service



forest insect & disease management methods application group

2810 Chiles Rd. ■ Davis, Ca. 95616

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NEWSLETTER

SURVEY OF MOUNTAIN PINE BEETLE ON THE BEAVERHEAD AND GALLATIN NATIONAL FORESTS WITH HIGH ALTITUDE RECONNAISSANCE PHOTOGRAPHY COMPLETED

During the past year, the Northern Region FI&DM staff in Missoula, MT, and MAG cooperated in a demonstration to determine the feasibility of using color infrared reconnaissance (optical bar) aerial photography to estimate annual mortality of lodgepole pine by the mountain pine beetle. Outbreaks on the Beaverhead and Gallatin National Forests in Montana were used as test sites.

Sampling procedures used in this survey were described in a previous Newsletter. This involved a three-stage variable probability design using probability proportional to size (PPS) with the third and final level being ground truth.

The survey has been completed and the results indicate that panoramic photography can provide estimates of annual mortality caused by mountain pine beetle over a large outbreak area. The test site, with its exceptionally precipitous and varied terrain, provided an excellent test of the geometric peculiarities of this unconventional format photography. A preliminary analysis of survey data showed mortality of lodgepole pine in 1977 to be $1,891,510 \pm 194,804$ trees and $27,001 \text{ M} \pm 3682 \text{ M}$ cubic feet. These data are comparable with data obtained from a conventional aerial sketchmap-photo survey conducted over the same area.

The panoramic photography, with its rectangular format and variable scale,

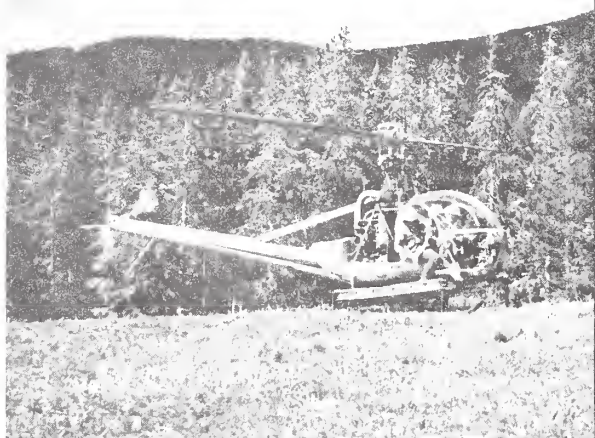
presented some unique interpretation and viewing problems but these were surmountable. Photointerpretation was done with the aid of modified microfiche viewers and stereozoom microscopes. The development of a portable field stereo viewer permitted the individual frames of film to be left in tact and taken directly to the field. This eliminated the need for photo enlargements and made full use of the excellent photo resolution. Panoramic distortion was compensated for and photo-to-map transfer was accomplished through the use of transparent equal-area grids.

A joint Northern Region/MAG report describing results of this survey will be published in the near future.

HIGH ALTITUDE RECONNAISSANCE PHOTOGRAPHY OF THE OCHOCO NATIONAL FOREST

Reconnaissance scale (1:30,000) color infrared photography in a 9" x 18" format was taken in September of the Ochoco National Forest, Oregon. Photography was requested by the Forest to aid in planning timber sales for the salvage of mountain pine beetle-threatened and -killed timber. Don Wood, Forest Silviculturist, is coordinating the Forest-wide effort.

During late November, John Wear, Region 6 FI&DM, Al Koch, Region 6 Engineering, and Bill Klein, MAG, conducted a two-day informal session in Prineville to familiarize Forest and District personnel in the use of this large format imagery. The first day was spent discussing the physical characteristics of the photography, various techniques and tools to view and



above left: A helicopter was used to reach the most inaccessible ground plots.

above: Dayle Bennett, FI&DM, R-1, establishing plot boundaries.

left: Crew preparing to locate and cruise ground truth plot. Left to right: Dick Hinkle, Jim Prill, Lockheed Electronics Corp.; Emmett Wilson, FI&DM, SA (formerly R-3). Spanish Peak Wilderness in background.

interpret the imagery, and potential applications. The major need was to locate the threatened green stands where beetle populations were beginning to build, rather than those areas exhibiting past mortality.

The morning of the second day was spent in the field viewing the color infrared photography first hand. In the area visited, ponderosa pine faders could be detected readily on the imagery. For most participants this was the first experience with color infrared imagery and transparencies. The viewing of the relatively unique 9" x 18" format was aided by a specially constructed stereoviewer developed at MAG. Forest personnel were impressed with the quality of the imagery, and expressed the desire to use it, provided that they had the proper training and necessary viewing hardware.

MONTANA STATEWIDE MOUNTAIN PINE BEETLE DAMAGE SURVEY

The Northern Region FI&DM staff conducted a multistage survey in 1979 to measure annual mortality of lodgepole pine caused by the mountain pine beetle in western Montana. MAG provided assistance in planning, photo interpretation, and data analysis. Jule Caylor and Walt Salazar of the FI&DM staff, Pacific Southwest Region, took the large-scale (1:6000) color aerial photography. The outbreaks covered portions of seven National Forests, the Beaverhead, Deerlodge, Flathead, Gallatin, Helena, Kootenai, and Lolo, and Glacier National Park.

Preliminary results show that more than 11 million lodgepole pine were killed by the mountain pine beetle in 1978. The standard error for the total survey was a respectable 9.8 percent.

WESTERN HEMLOCK DWARF MISTLETOE IN ALASKA

Management recommendations for control of dwarf mistletoe on western hemlock in southeastern Alaska are based on studies and visits by forest pathologists 10-20 years ago. Recent data collected by Terry Shaw of the Pacific Northwest Forest and Range Experiment Station suggest that the spread of the parasite in newly regenerated stands (15-20 years old) is not nearly as rapid or extensive in Alaska as would be expected in southern British Columbia, Washington, or Oregon. Therefore, timber managers in Alaska may have the option to initiate dwarf mistletoe control during pre-commercial thinning operations which normally occur when the new stands reach 15-20 years of age. In most cases the Region could alter its policy of dwarf mistletoe control and wait until the first pre-commercial thinning operation to remove infected trees.

In a recent visit to southeastern Alaska by Dave Drummond of MAG and Frank Hawksworth of the Rocky Mountain Forest and Range Experiment Station, it was recommended that the Region consider altering its policy regarding dwarf mistletoe control prior to pre-commercial thinning. Other recommendations dealt with research needs, among the most important being the continuation of studies dealing with the parasite's spread and intensification in southeastern Alaska.

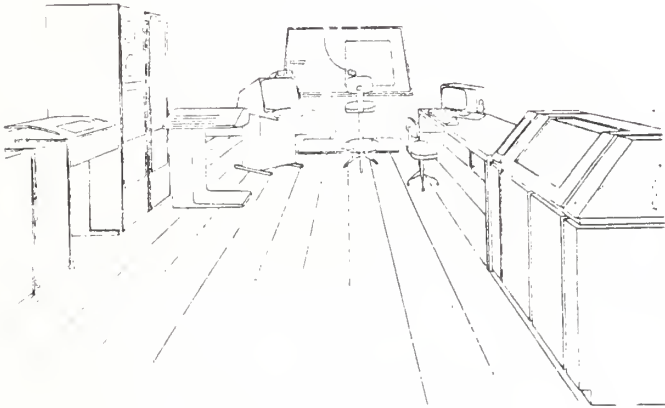
PROPOSAL TO ACQUIRE A GEOGRAPHIC INFORMATION SYSTEM

FI&DM has established forest insect and disease data and information requirements for local/Forest/state, Regional, and national levels of reporting. This reporting system has been designated the Forest Insect and Disease Information System (FIDIS). Evaluation and feasibility studies to effectively implement FIDIS have been conducted for the last four years and have culminated in the submission of a proposal to the Chief for acquisition of a

geographic information system for data storage and retrieval.

The proposal calls for a host unit to be located at Davis, California, and four microprocessor-equipped field units located with the FI&DM staffs at Portland, Missoula, Denver, and Anchorage. Field unit configuration provides local digitizing, editing, summarizing, and plotting of annual insect and disease survey data. The host unit and MAG personnel will provide the following functions:

- Perform map overlays for field units
- Provide leadership for designing data analysis procedures



above: Example of host unit configuration

-Maintain geographic computer files for field units

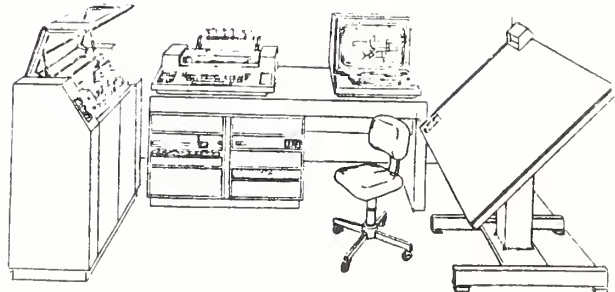
-Provide training for additional applications:

- a. insect and disease modeling
- b. utilizing optical bar photography
- c. risk rating systems for long-range planning

-Provide interim support to other Regions/Areas pending delivery of future field units (Regions 3, 4, 5; NA, SA)

Management approval was given by the USDA Forest Service's Systems Coordinating Council in October, and technical review and evaluation is now underway.

below: Example of field unit configuration



DOUGLAS-FIR TUSSOCK MOTH EARLY WARNING SYSTEM

A meeting was held in November to discuss the desirability of implementing a West-wide early warning system for detecting Douglas-fir tussock moth infestations. The meeting was conducted in response to recommendations made by the Douglas-fir Tussock Moth Survey Methods Working Group during the USDA Expanded R&D Program.

It was recommended that a West-wide DFTM early warning system based on pheromone trapping of adult male moths be initiated. Allan Bullard, MAG entomologist, will coordinate the effort. MAG will supply Regions with the traps to be used and the pheromone bait material for the traps. Additionally, MAG will develop a standard data form, serve as a repository for the data collected throughout the West, and annually provide summaries of these data to all cooperators. The Pacific Northwest Forest and Range Experiment Station, through MAG, will continue to provide the pheromone bait material until a contractor can be found to produce this at a satisfactory level of quality.

Field plot selection and trapping under the agreed-upon West-wide guidelines will begin in 1980.

WEST-WIDE SPRUCE BUDWORM DEFOLIATION FORECAST SYSTEM EXPANDS COMPUTER PROGRAM AND DATA BASE

Western Regions have completed work on data collection and summarization for western spruce budworm egg mass densities and defoliation estimates from the 1979 field season. The 1979 data has been added to the 1976-78 data base, providing four years of egg mass densities and three corresponding defoliation estimates from the same locations.

Significant accomplishments during the last six months include:

- Computer edit programs have been developed for egg mass and defoliation data.
- All data, 1976-79 egg masses and 1977-79 defoliation, have been processed through the edit programs and are free of errors.
- New summaries have been generated for all data and delivered to Regional personnel during October and November.
- Aggregation programs have been developed to link all similar data from the same cluster in preparation for regression analysis.

In addition to four years of egg mass densities and three years of defoliation estimates, Regions 1 and 4 collected physical attribute data associated with each cluster. These data include slope, aspect, elevation, physiographic site, species composition, stand structure, and basal area. These factors are going to be combined with egg masses to see if better prediction models can be developed.

Data analysis is currently underway, and results will be available in April 1980.

JOINT MEETING OF FI&DM, TIMBER MANAGEMENT, AND RESOURCES EVALUATION STAFF GROUPS

A joint meeting of Forest Survey, Timber Inventory, and FI&DM personnel was held in Albuquerque in November. Purpose of this meeting was to explore opportunities to improve insect and disease data collection through forest inventory. Discussion centered on (1) how to ensure that FI&DM is involved in the initial planning of inventories, (2) possible changes in data collection procedures and how to coordinate

the use of these data, and (3) improved training to ensure that crews are qualified to collect data on insect and disease damage. Participants generally agreed that FI&DM be responsible for identification of insect and disease pests whose symptoms lend themselves to detection through forest inventory. FI&DM should conduct surveys for important pests that inventory procedures are not suited to detect. These data can be integrated with inventory data collected at the same time. The general response of participants was favorable, with everyone agreeing that a cooperative approach to insect and disease data collection would benefit all those concerned. Recommendations from this meeting will be submitted to the Chief in early 1980.

INTEGRATED PEST MANAGEMENT WORKSHOP

Forest Insect and Disease Management is sponsoring a workshop entitled "Integrated Pest Management in Forestry". This workshop will be held in Denver, Colorado, on April 22-24, 1980. Objectives are to define integrated pest management and its components, outline current USDA direction in IPM, describe successful approaches to IPM in agriculture, forestry, and public health, and identify new opportunities to apply IPM concepts in forestry.

Primary audience the workshop is designed for is forest insect and disease management specialists at the federal and state level.

For information contact Bill Ciesla at FI&DM/MAG.

MAG STAFF ACTIVITIES

Patricia (Patti) Kenney joined the MAG Staff as Biological Technician in October. Patti transferred from the Mt. Hood National Forest in Oregon, where she was assigned as Hydrological Technician.

Belinda Allen, MAG clerk-typist, has accepted a job as laboratory technician for the Water Quality staff, City of Stockton, California.

Melissa Morgan and Chris Cunningham, both students at UC Davis, are working at MAG on a part-time basis through the college work-study program.

Bill Ciesla presented an informal paper entitled "Data Management in Forest Insect and Disease Management" at the annual meeting of the Insect Committee of the California Pest Action Council in Sacramento. He also presented a paper entitled "Operational Remote Sensing for Forest Insect and Disease Management: Some Challenges and Opportunities" at an International Symposium on Remote Sensing of the Environment, sponsored by the University of Idaho, Moscow.

Bill Ciesla was an instructor in a short course on applications of remote sensing in forestry sponsored by the Remote Sensing Technology Transfer Project, Humboldt State University, Arcata, California. Bill conducted a laboratory and field session on uses of color and color infrared photography in vegetation mapping, vegetation management, and forest damage assessment.

Bill Klein presented a paper entitled "Measuring Mountain Pine Beetle-Caused Tree Mortality with Aerial Photographs" at the National Meeting of the Society of American Foresters in Boston, Massachusetts.

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